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[54] **Title**: Folding Portable Telephone Device

[57] **Abstract**

A first display composed of a liquid crystal display is provided on the outer surface of a first body case. A non-voice radio communication service start key, a scroll key and a selection/decision key are located next to the first display. A second display is provided on the inner surface of the first body case, and a slantwise retractable antenna is provided on the side of a second body case. A magnet is inserted in the first body case, and a status switch is built in the second body case. The status switch turns on when the main body is folded and the magnet is closed to the status switch, and it turns off when the main body is unfolded and the magnet is separated from the status switch, thereby detecting the folding/unfolding state of the body case.

## *Claims*

What is claimed is:

1. A folding portable telephone device, comprising:

a folding main body;

a first display provided on the outer surface of the folding main body and used for displaying the received non-voice information;

a second display provided on the inner surface of the main body.

2. A folding portable telephone device according to claim 1, further comprising an operating means for actuating at least one of the operations of starting and ending the non-voice information communication.

3. A folding portable telephone device according to claim 1, wherein the received non-voice information is displayed on the first display when the main body is folded, and the received non-voice information is displayed on the second display when the main body is unfolded.

4. A folding portable telephone device according to claim 3, wherein the display of the received information is switched according to the new folding/unfolding state when the folding/unfolding state of the main body is changed.

5. A folding portable telephone device according to claim 4, wherein the received information is switched from the first display to the second display, the received information displayed on the first display is deleted, and a predetermined information is displayed on the first display when the main body is unfolded and the received information is displayed on the second display.

6. A folding portable telephone device according to claim 1, further comprising an antenna which is provided on the side of the main body and can be retracted slantwise in the width direction of the main body.

7. A folding portable telephone device according to claim 6, wherein the main body comprises a first body case on which the display is provided and a second body case; the antenna is provided on the side of the second body case.

8. A folding portable telephone device according to claim 1, wherein the main body comprises a first body case and a second body case, and the inner surfaces of the first body case and the second body case are faced each other when the main body is folded, moreover, the first display is provided on the outer surface of the first body case while the second display is provided on the inner surface of the first body case.

## *Description*

## Folding Portable Telephone Device

The present invention relates to a folding portable telephone device which has a function of displaying non-voice information such as texts, graphics and so on.

Recently, a portable telephone device is already enabled to support non-voice radio communication service (hereinafter referred to as "service") such as a text or graphic information of the information mode service (i-mode service). The portable telephone device receiving such service allows the user to scroll the screen and read the received text information in a hierarchical manner by means of service receiving operation, menu selecting operation and screen scrolling operation. In order to make use of the service, the portable telephone device must comprises a radio communication means, an operating means for requesting the start of the service, a memory unit for storing the received information, a display means for displaying the stored information, a menu selection/decision means, a scroll means and a control means for controlling all operations of the telephone device.

A conventional portable telephone device having an input operation area for sending electronic mails and entering telephone numbers comprises many keys placed densely on an operating panel of the operation area and a large liquid crystal display for displaying various characters, which unavoidably caused an increase in size of the main body of the portable telephone device.

Thus, there appeared a folding portable telephone device as shown in Fig. 10A-C. This portable telephone device is not folded while being used, but it can be carried in a small-size state folded into two parts while not being used. However, this kind of telephone device is always in a large-size, unfolding state while being used, and the display and the operating panel are faced each other when the main body is folded. Therefore, the display can not be seen and the operating panel can not be touched when the telephone device is in a folding state, as a result, it is impossible to know the content of the received non-voice information such as text information, or to perform a hierarchical retrieval when the telephone device is folded into small size.

The object of the present invention is to provide a folding portable telephone device, which allows the user to display, scroll and read the non-voice information such as a text or a graphic, retrieve the non-voice information in a hierarchical manner, and display the retrieved information on the telephone device which has been folded into small size through providing a display means and an operating means needed for making use of the non-voice radio communication service on the outer surface of the main body of the telephone device.

The first aspect of the present invention is to provide a folding portable telephone device with a folding main body, wherein the telephone device has a first display for displaying the received non-voice information on the outer surface of the main body and a second display on the inner surface of main body. With such a structure, the information of non-voice radio communication service such as "The News at 7:00" and "The News at 12:00" can be displayed automatically on the first display which is provided on the outer surface of the main body without any special operation, when the folding portable telephone device receives a text information such as a news information released automatically at a predetermined time.

The second aspect of the present invention is to provide a folding portable telephone device with a folding main body, wherein the telephone device has at least an operating means for starting and ending the non-voice radio communication, and a first display for displaying the received non-voice information on the outer surface of the main body and a second display on the inner surface of the main body. With such a structure, the user can actuate the operating means for starting the non-voice radio communication to make a request to start the non-voice communication service in a folding state of the folding telephone device, and read the received information on the first display provided on the outer surface of the main body.

According to the first aspect or the second aspect of the present invention, the third aspect of the present invention is to provide a folding portable telephone device comprising at least a folding main body, a first display provided on the outer surface of the main body for displaying the received information and a second display provided on the inner surface of the main body, wherein the telephone device can display the received non-voice information on the first display provided on the outer surface of the main body when the main body is folded, while it can display the received non-voice information on the second display provided on the inner surface of the main body when the main body is unfolded. With such a structure, the information can be displayed on a display corresponding to the folding/unfolding state of the main body.

According to the first aspect or the second aspect of the present invention, the fourth aspect of the present invention is to provide a folding portable telephone device comprising at least a folding main body, a first display provided on the outer surface of the main body for displaying the received information and a second display provided on the inner surface of the main body, wherein the telephone device can display the received non-voice information on the first display provided on the outer surface of the main body when the main body is folded, while it can display the received non-voice information on the second display provided on the inner surface of the main body when the main body is unfolded, so that the display of received information is switched to the display corresponding to the new folding/unfolding state and display the information on the proper display when the folding/unfolding state of the main body is changed. With such a structure, the information can be displayed on the display corresponding to the folding/unfolding state of the main body even when the folding/unfolding state of the main body is changed.

According to the fourth aspect of the present invention, the fifth aspect of the present invention is to provide a folding portable telephone device comprising at least a folding main body, a first display provided on the outer surface of the main body to display the received information and a second display provided on the inner surface of the main body, wherein the telephone device can switch the display of received information from the first display to the second display on the inner surface of the main body when the main body is unfolded, and the received information is displayed on the second display provided on the inner surface of the main body, at the same time, the information displayed on the first display is deleted, and a predetermined information is displayed instead. With such a structure, when the main body is unfolded, the predetermined information can be displayed on the first display exposed.

According to the first aspect or the second aspect of the present invention, the sixth aspect of the present invention is to provide a folding portable telephone device, wherein the telephone device has a tilting retractable antenna on the side of the main body. With such a structure, the antenna will not project in the thickness direction of the main body so as to keep the profile of the main body small, and the protruding of the antenna receiver under the antenna is reduced to decrease the size of the main body in the width direction, thereby, making it more easy to grasp the main body. Moreover, a display with a large size can be provided on the outer surface of the main body because the antenna receiver is located at the exterior of the outer surface of the main body.

According to the sixth aspect of the present invention, the seventh aspect of the present invention is to provide a folding portable telephone device, wherein the telephone device has a tilting retractable antenna on the side of the main body on which there is no display provided. With such a structure, the main body provided with a display can be folded/unfolded regardless of the direction of the antenna disposed on the second main body on which there is no display provided, and whether the antenna is stretched out or drawn back.

Fig. 1A is a side view of a folding portable telephone device with a folding main body according to the first embodiment of the present invention.

Fig. 1B is a front view of a folding portable telephone device with a folding main body according to the first embodiment of the present invention.

Fig. 2A is a side view of a folding portable telephone device with an unfolding main body according to the first embodiment of the present invention.

Fig. 2B is a front view of a folding portable telephone device with an unfolding main body according to the first embodiment of the present invention.

Fig. 3A is a side view of a folding portable telephone device with a folding main body according to the first embodiment of the present invention.

Fig. 3B is a front view of a folding portable telephone device with a folding main body according to the first embodiment of the present invention.

Fig. 4A is a side view of a folding portable telephone device with an unfolding main body according to the first embodiment of the present invention.

Fig. 4B is a front view of a folding portable telephone device with an unfolding main body according to the first embodiment of the present invention.

Fig. 5A and Fig. 5B are exterior views of a folding portable telephone device in the state of being grasped according to the first embodiment of the present invention.

Fig. 6 is a block diagram of a folding portable telephone device according to the first embodiment of the present invention.

Fig. 7 is a flow chart which shows the process of selecting a display in accordance with the opening/closing state of the main body when the non-voice radio communication service information is received in a procedure of displaying non-voice information of the folding portable telephone device according to the first embodiment of the present invention.

Fig. 8 is a flow chart which shows the process of selecting a display in accordance with the change of the opening/closing state of the main body when the non-voice radio communication service information is received in a procedure of displaying non-voice information of the folding portable telephone device according to the first embodiment of the present invention.

Fig. 9A is a side view of a folding portable telephone device with a folding main body according to the second embodiment of the present invention.

Fig. 9B is a front view of a folding portable telephone device with a folding main body according to the second embodiment of the present invention.

Fig. 9C is a front view of a folding portable telephone device with an unfolding main body according to the second embodiment of the present invention.

Fig. 10A is a side view of a conventional folding portable telephone device with a folding main body.

Fig. 10B is a front view of a conventional folding portable telephone device with a folding main body.

Fig. 10C is a front view of a conventional folding portable telephone device with a folding main body.

Hereafter, the embodiments of the present invention will be described with reference to Fig. 1 to Fig. 9.

Fig. 1A is a side view of a folding portable telephone device with a folding main body according to the first embodiment of the present invention. Fig. 1B is a front view of a folding portable telephone device with a folding main body according to the first embodiment of the present invention. Fig. 2A is a side view of a folding portable telephone device with an unfolding main body according to the first embodiment of the present invention. Fig. 2B is a front view of a folding portable telephone device with an unfolding main body according to the first embodiment of the present invention.

The folding portable telephone device is briefly descried below with reference to Fig. 1 and Fig. 2. The folding portable telephone device comprises a first body case 1 and a second body case 2 which are coupled by a hinge 3, and the first body case 1 and the second body case 2 can be folded or unfolded via hinge 3. As shown in Fig. 1B, the first display 4 includes a liquid crystal display provided on the outer surface of the first body case 1. A non-voice radio communication service start key 5, scroll keys 6a, 6b and a selection/decision key 7 are located next to the first display 4.

The second display 8 is provided on the inner surface of the first body case 1, and a tilting retractable antenna 9 is provided on the side of the second display 8. A magnet 18 is inserted into the first body case 1, and a status switch 19 is built in the second body case 2. The status switch turns on when the main body is folded and the magnet is closed to the status switch 19, and it turns off when the main body is unfolded and the magnet 18 is separated from the status switch 19, thereby detecting the folding/unfolding state of the body case.

Fig. 2A shows a folding portable telephone device with the first body case 1 unfolded upward. The unfolded first body case 1 enables a control means (to be mentioned later) to display text and graphic information on the second display 8 provided on the inner surface of the first body case 1. At the same time, the information displayed on the first display 4 will be deleted when the main body is folded, and the backlight of liquid crystal flashes slowly instead.

A key operation area is provided on the inner surface of the second body case as shown in Fig. 2B. The key operation area comprises a ten-digit keypad 10, a so-called navigation key 11 which consists of four arrow keys scrolling towards four directions and a center key for determining a target information, a call start key 12a, a call release key 12b, a menu key 13 and a non-voice radio communication service start key 14 for receiving the non-voice radio communication such as the i-mode.

A transmitter (microphone) 15 is disposed at the lower part of the second body case 2, and a receiver 16 is disposed at the lower part of the first body case 1. The ten-digit keypad 10, the navigation key 11, the call start key 12a, the call release key 12b, the menu key 13, the transmitter (microphone) 15 and the receiver 16 are used for voice communication, while the non-voice radio communication service start key 14 and the navigation key 11 are used for non-voice communication.

Fig. 3A and Fig. 4A are side views of the folding portable telephone device in the state of the antenna stretched out according to the first embodiment of the present invention. Fig. 3B and Fig. 4B are front views of the folding portable telephone device in the state of the antenna drawn back according to the first embodiment of the present invention. In this invention, antenna 9 is enabled to stretch out and draw back from bottom to top on the side of the second body case, therefore, the first body case 1 can be folded/unfolded regardless of the direction of antenna 9, and whether the antenna 9 is stretched out or drawn back. Moreover, side grooves 17 work as an antiskid means when the main body is grasped.

Fig. 5A and Fig. 5B are exterior views of a folding portable telephone device in the state of being grasped according to the first embodiment of the present invention. In the first embodiment of the present invention, a user can hold the second body case 2 in his/her palm as shown in Fig. 5A, and pull out the antenna as shown in Fig. 3. Also, the user can hold the second body case 2 in his/her palm as shown in Fig. 5B, and pull out the antenna when the first body case 1 is unfolded upward as shown in Fig. 4. In both cases, the user can hold the second body case 2 in his/her palm as shown in Fig. 5A and Fig. 5B, at the same time, antenna 9 can be stretched out and drawn back from bottom to top on the side of the second body case 2 regardless of whether the main body is folded or unfolded.

Fig. 6 is a block diagram briefly showing the structure of a folding portable telephone device according to the first embodiment of the present invention. In Fig. 6, the radio wave input from an antenna 20 is received by a receiver (not shown) of a radio communication means 21, and the received information is transferred to a controller 22. The controller 22 displays the received information such as telephone numbers on the first display 4 or on the second display 8. In addition to telephone numbers, the received information also includes, for example, text information of non-voice radio communication service such as the news information released automatically at a predetermined time. The non-voice radio communication service information can be displayed on the first display provided on the inner surface of the first body case 1 without any special operation, or displayed on the second display 8 provided on the inner surface of the first main body under the state of the main body unfolded when the information such as the news released automatically at a predetermined is received.

The controller 22 illuminates display 4 and display 8 respectively with backlight by setting it. The controller can also convert the received information into voice information, and output the voice information from a receiver (speaker) 23. Transmitter (microphone) 24 sends the voice of user to the controller 22, then, the information is transferred to a far end through a sender (not shown) of radio communication means 21 and the antenna 20. A signal can be input into the controller 22 by key operation performed in the key operation area including a ten-digit keypad and a scroll key, and the information such as telephone number etc. can be stored in memory 25 through the controller 22.

When the non-voice communication service start key 5 (Fig. 1B) or 14 (Fig. 2B) is pressed, the controller 22 sends a signal requesting the non-voice radio communication service to a base station through the sender (not shown) of the radio communication means 21 and antenna 20. The non-voice radio communication service information transmitted from the base station is received by the antenna and the receiver (not shown) of the radio communication means 21, and the received information is stored in memory 25 by the controller. A cover opening/closing state detector 27 sends the detected information to the controller 22 according to the opening/closing state of the cover. Based on the detected result, the controller 22 displays the non-voice information which is corresponding to the opening/closing state of the main body and stored in memory 25 on the first display 4 or the second display 8.

Fig. 7 is a flow chart which shows the process of selecting a display in accordance with the opening/closing state of the main body when the non-voice radio communication service information is received. For a folding portable telephone device under the condition that the power has been turned on and it is in the state of waiting for a call access (step 1), when the non-voice radio communication service start key 5 is pressed (step 2), the radio communication means 21 sends a signal requesting the non-voice communication service to the base station, and receives the non-voice information such as texts and graphics etc. from the base station (step 3). Controller 22 determines whether the main body is folded or not according to the opening/closing state of the cover which is detected by the cover opening/closing state detector 27 (step 4).

When the main body is folded, the controller 22 displays the non-voice information on the first display 4 (step 5). The display is scrolled when the scroll key 6a/6b is pressed (step 6). For the information mode (i-mode), the selection/decision key 7 is used to select a menu and retrieve information, and the information is displayed in a hierarchical manner (step 7).

When the main body is unfolded, the non-voice information is displayed on the second display (step 9). When the navigation key 11 (Fig. 2B) on the inner surface of the main body is operated (step 9), the display is scrolled, the information is retrieved and displayed in a hierarchical manner as instructed (step 10).

Thus, the non-voice information is displayed on the first display 4 or on the second display 8 according to the folding/unfolding state of the main body. The information displayed on the first display 4 on the outer surface of the folded main body is the same as that displayed on the second display 8 on the inner surface of the unfolded main body.

Fig. 8 is a flow chart which shows the process of selecting a display in accordance with the change of opening/closing state of the main body when the non-voice radio communication service information is received. As shown in the flow chart of Fig. 8, when the main body is unfolded (step 11) and the information is displayed on the first display 4 of the folded main body, the information is transferred from the first display to the second display 8 (step 12), and the information displayed on the first display is deleted immediately (step 13), and a predetermined information is displayed instead (step 14). The predetermined information can be some graphics or characters which express one's apologies to the people around user before requesting a call, for example, "Speaking now. Sorry to disturb you." etc., or only the backlight of the liquid crystal flashes slowly without any text or graphic to let the people around user know that the user is speaking.

When the main body is folded and the information is displayed on the second display 8 of the unfolded main body, the information on the second display 8 is transferred to the first display 4 (step 16), and at the same time, the information displayed on the second display 8 is deleted immediately (step 17).

As described above, according to the present invention, it is possible to see the text and graphic information of the information mode (i-mode) etc. that can not be displayed on a conventional folding portable telephone device by easily using a few limited operating keys on the main body which is folded into a small size. Moreover, it is possible to read the information by scrolling the display, and retrieve the information in a hierarchical manner. In other words, the new folding portable telephone device provided in the present invention can eliminate the limit in use of the conventional folding portable telephone device with which the received non-voice information can be used or the received non-voice information can not be operated unless the main body is unfolded.

According to the present invention, the non-voice information is displayed on the display corresponding to the folding/unfolding state of the main body. Even the folding/unfolding state is changed while the information is displayed on the proper display, the information also can be displayed on the display corresponding to the new folding/unfolding state of the main body.

Fig. 9 shows the second embodiment of the present invention. The difference between the second embodiment and the first embodiment is in that the antenna 9 is disposed on the side of the first body case 1 on which the first display 4 and the second display 8 are provided. Fig. 9A is a side view of a folding portable telephone device with a folding main body according to the second embodiment of the present invention. Fig. 9B is a front view of a folding portable telephone device with a folding main body according to the second embodiment of the present invention. Fig. 9C is a front view of a folding portable telephone device with an unfolding main body according to the second embodiment of the present invention. The same numbers are used in Fig. 9 for the same parts as used in the first embodiment.

In the second embodiment of Fig. 9, the antenna 9 is disposed on the side of the first body case 1 in a retractable way. The advantage of this configuration is that the first display 4 with a large-size can be used even when the retracting operability of the antenna is almost the same as in a conventional embodiment shown in Fig. 10.

Moreover, in the first embodiment of the present invention in which the main body is grasped as shown in Fig. 5, the antenna 9 is disposed on the side of the second body case 2 on which neither the first display 4 nor the second display 8 is provided, and the antenna 9 is enabled to be stretched out and drawn back from bottom to top of the side of the second body case 2. As shown in Fig. 10, the antenna receiver is provided at the exterior of the outer surface of the first body case, therefore, a display with a large size can be located on the outer surface of the first body case 1. The antenna 9 also can be disposed on the second body case 2 which is held by user's palm, thereby, the first body case 1 can be folding/unfolding regardless of the direction of the antenna 9 provided on the second body case 2 and whether the antenna 9 is stretched out or drawn back.

The telephone device can keep a small main body profile in the case of that the antenna is not projected in the thickness direction of the main body, and the protruding of the antenna receiver is decreased so as to reduce the size of the main body in the width direction, thereby, making it easy to grasp the main body.

As mentioned above, the first aspect of the present invention is to provide a folding portable telephone device with a folding main body, wherein a first display for displaying the received non-voice information is provided on the outer surface of the main body and a second display is provided on the inner surface of the main body. The advantage of such a structure is that when the folding portable telephone device receives a text information such as a news information released automatically at a predetermined time, the information of non-voice radio communication service such as "The News at 7:00" and "The News at 12:00" can be displayed automatically on the first display which is provided on the outer surface of the main body without any special operation.

The second aspect of the present invention is to provide a folding portable telephone device with a folding main body, wherein the telephone device has at least an operating means for starting and ending the non-voice radio communication, a first display for displaying the received non-voice information on the outer surface of the main body, and a second display on the inner surface of the main body. The advantage of such a structure is that the user can actuate the operating means for starting the non-voice radio communication to make a request to start the non-voice radio communication service in a folding state of the folding telephone device, and read the received information on the first display provided on the outer surface of the main body.

According to the first aspect or the second aspect of the present invention, the third aspect of the present invention is to provide a folding portable telephone device comprising at least a folding main body, a first display provided on the outer surface of the main body for displaying the received information and a second display provided on the inner surface of the main body, wherein the telephone device can display the received non-voice information on the first display provided on the outer surface of the main body when the main body is folded, while it can display the received non-voice information on the second display provided on the inner surface of the main body when the main body is unfolded. The advantage of such a structure is that the information can be displayed on a display corresponding to the folding/unfolding state of the main body.

According to the first aspect or the second aspect of the present invention, the fourth aspect of the present invention is to provide a folding portable telephone device comprising at least a

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folding main body, a first display provided on the outer surface of the main body to display the received information and a second display provided on the inner surface of the main body, wherein the telephone device can display the received non-voice information on the first display provided on the outer surface of the main body when the main body is folded, while it can display the received non-voice information on the second display provided on the inner surface of the main body when the main body is unfolded, so that the display of received information is switched to the display corresponding to the new folding/unfolding state when the folding/unfolding state of the main body is changed with the information displayed on the proper display. The advantage of such a structure is that the information can be displayed on the display corresponding to the folding/unfolding state of the main body even when the folding/unfolding state of the main body is changed.

According to the fourth aspect of the present invention, the fifth aspect of the present invention is to provide a folding portable telephone device comprising at least a folding main body, a first display provided on the outer surface of the main body to display the received information and a second display provided on the inner surface of the main body, wherein the telephone device can switch the display of received information from the first display to the second display on the inner surface of the main body when the main body is unfolded, and the received information is displayed on the second display provided on the inner surface of the main body, at the same time, the information displayed on the first display is deleted and a predetermined information is displayed instead. The advantage of such a structure is that the predetermined information can be displayed on the first display exposed when the main body is unfolded.

According to the first aspect or the second aspect of the present invention, the sixth aspect of the present invention is to provide a folding portable telephone device, wherein the telephone device has a tilting retractable antenna on the side of the main body. The advantage of such a structure is that the antenna will not project in the thickness direction of the main body so as to keep the profile of the main body small, and the protruding of the antenna receiver under the antenna is reduced to decrease the size of the main body in the width direction, thereby, making it more easy to grasp the main body. The further advantage is that a display with a large size can be provided on the outer surface of the main body because the antenna receiver is located at the exterior of the outer surface of the main body.

According to the sixth aspect of the present invention, the seventh aspect of the present invention is to provide a folding portable telephone device, wherein the telephone device has a tilting retractable antenna on the side of the main body on which there is no display provided. The advantage of such a structure is that the main body provided with a display can be folding/unfolding regardless of the direction of the antenna disposed on the second main body on which there is no display provided and whether the antenna is stretched out or drawn back.

According to the first aspect of the present invention, the eighth aspect of the present invention is to provide a folding portable telephone device, wherein the folding main body comprises a first body case and a second body case which are faced each other when the main body is folded, and the first display is provided on the outer surface of the main body and the second display is provided on the inner surface of the main body.

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# TRANSLATION OF DRAWINGS

Fig. 6

21: radio communication section
22: controller
25: memory
26: key operation area
27: cover opening/closing state detector
4: first display
8: second display

Fig. 7

S1: waiting state for call access
S2: is the non-voice service key pressed ?
S3: receive non-voice information
S4: is the main body folded ?
S5: display on the first display
S6: is the scroll key pressed ?
S7: display as instructed by the scroll key
S8: display on the second display
S9: is the scroll key pressed ?
S10: display as instructed by the scroll key

Fig. 8

S11: is the main body unfolded ?
S12: display the information displayed on the first display on the second display
S13: delete the information displayed on the first display
S14: display the predetermined information on the first display
S15: is the main body folded ?
S16: display the information displayed on the second display on the first display
S17: delete all information displayed on the second display